 **UNIVERSITY OF MAINE AT FARMINGTON**

**COLLEGE OF EDUCATION, HEALTH AND REHABILITATION**

**LESSON PLAN FORMAT**

**Teacher’s Name:**Ms. Libby **Lesson #:** 5 **Facet:** Perspective  
**Grade Level:** 9th Grade **Numbers of Days:** 3 - 4 Days  
**Topic:** Linear Equations  
  
**PART I:**  
**Objectives**  
Students will understand that graphing two formula functions can allow for finding approximate solutions to the equation  
Students will know inequalities, equations, slope intercept form.  
Students will be able to infer that graphing two formula functions can allow for finding approximate solutions to the equation.  
**Product:**Student Publishing  
  
**Maine Learning Results (MLR) or Common Core State Standards (CCSS) Alignment**  
**Math Common Core State Standards**  
**Content Area:** Algebra  
**Grade:** High School  
**Domain:** Reasoning with Equations and Inequalities  
**Cluster:** Solve systems of equations  
**Standard:**   
6. Solve systems of linear equations exactly and approximately, focusing on pairs of linear equations in two variables.  
7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically  
**Rationale:**   
Students will meet standard seven by creating equations using real-world examples and solving them using graphic organizers to synthesis their data.  
  
**Assessments**  
**Formative (Assessment for Learning)**  
**Section I – checking for understanding during instruction**  
Students will each have three colored sticky notes. A red, yellow, and green sticky. Each one corresponds to their level of understanding and the students will raise the colored sticky at the end of the lesson to see their level of understanding.  
**Section II – timely feedback for products (self, peer, teacher)**   
Students will self-assess themselves using a rubric. Teacher will provide feedback on the student publishing.  
  
**Summative (Assessment of Learning):**  
Student Publishing (75 points) Students must write a short story explaining how to solve a simple system of linear inequalities. They will be writing this story for other classes to read in future years. Students must be precise and clear on the techniques and will be writing to students that have never learned the concept before. Students must provide many easy to understand examples and visual graphs to make the concept easier to understand. Student will peer edit each other to swap ideas and to make sure there are no mechanical or grammatical errors.  
  
**Integration**  
**Technology:**  
Students will be using student publishing to further their understanding on how to solve linear equations by creating a shower story. This will let them create their story any way they like but they must include the steps that are needed in solving linear equations. They have to formulate their thoughts and write the story to someone that has no previous knowledge on the concept.  
**Content Areas:**  
**Art:** Students get to create their short story and decorate the pages any way they like. The can choose how the format of the short story will look like.  
**English:** Students have to write in the book and explain the steps needed in order to solve linear equations.  
  
**Groupings**  
**Section I - Graphic Organizer & Cooperative Learning used during instruction**  
Students will use the KWL chart which stands for Know, Want, and Learn. They will keep track of their progress throughout the lesson. They will play Circle the Sage where one person will stand in each corner. These students have a special and more advanced understanding of different parts of the lesson. The rest of the class will visit each student and the sages will explain their understanding.  
**Section II – Groups and Roles for Product**  
Students will be working together when completing the product. This way they can have a second opinion on the format of their book and to proof read their book. This way they do not miss any grammatical or spelling errors. Students have the choice to work in groups, partners or alone. It does not matter the number of people in a group. This way, students are not limited on the amount of feedback they get from their fellow peers.  
  
**Differentiated Instruction**  
**MI Strategies**  
**Verbal:** While students are playing circle the sage, they will discuss the concept and listen to the sage's explanation.  
**Logic:** Students will use the KWL chart to decipher their thoughts on the chart for better understanding.  
**Visual:** Students must create a student publishing booklet that will include visuals for easier understanding.  
**Kinesthetic:** The students will be moving around the classroom while they visit each sage.  
**Intrapersonal:** Students will work alone as they fill out the KWL chart.  
**Interpersonal:** Students will be interacting with each other as they move around the room to visit the sages.  
  
**Modifications/Accommodations**  
***From IEP’s ( Individual Education Plan), 504’s, ELLIDEP (English Language Learning Instructional Delivery Education Plan)****I will review student’s IEP, 504 or ELLIDEP and make appropriate modifications and accommodations.*  
  
**Plan for accommodating absent students:**   
Students that are absent will still be expected to create their short story. Students will have a Skype buddy that was assigned at the beginning of the year and they will Skype into class if a computer is available to them. That way they are receiving the same instruction as their students and they are still part of the class. Students that miss the lesson will have an absent folder with all the worksheets that they missed. Students will meet with the teacher after school and during office hours to go over the graphic organizer and to get instruction on the student publishing product.  
  
**Extensions**  
**Type II technology:**   
Students will use the student publishing to create their own short story on how to solve linear equations. They will have to write the story to someone that does not have previous knowledge on the concept. They will have to think critically and figure out they solve the equations and put it into a way that someone else will understand if they are learning the concept for the first time.  
  
**Gifted Students:**   
Gifted students will still have to create their short story but they will also have to include how to graph linear equations. This way they will have to think critically on not only how to solve linear equations but also on how to graph them.  
  
**Materials, Resources and Technology**  
Graphic Organizer (KWL chart)  
Laptops  
White Board  
White Board Markers  
Graphing Papers  
Calculators  
  
**Source for Lesson Plan and Research**  
**Student Publishing**  
  
<http://www.studentpublishing.com/> - This is where the teacher can go to find out more about student publishing and to get it started for the students.  
**KWL Chart**  
<http://www.eduplace.com/graphicorganizer/pdf/kwl.pdf> - This is where the graphic organizer for this lesson is located.  
**Cooperative Learning**  
<http://edu221resources.wikispaces.com/file/view/cooperative_learning_strategies.pdf/426402320/cooperative_learning_strategies.pdf>- This is where many cooperative learning strategies are located and where circle the sage is located for this lesson.  
Checking For Understanding  
<http://edu221spring11class.wikispaces.com/file/view/strategies.pdf/200849872/strategies.pdf> - This where many checking for understanding strategies are located as well as the one for this lesson.  
Hook/Hoop Shoot Equation Game  
<http://www.math-play.com/Equation/Equation-Game-Online.html> - This is where the hook for this lesson is located.  
  
**PART II:**   
**Teaching and Learning Sequence (Describe the teaching and learning process using all of the information from part I of the lesson plan)**  
  
*Classroom Arrangement: Desks will be in a half oval all facing inwards.*  
  
**Agenda:**   
*Day One (80 minutes):*

* Hook (10 minutes)
* Class discussion on graphic organizers (15 minutes)
  + Students will fill out first two columns on KWL chart.
* Class discussion on solving linear equations (20 - 25 minutes)
  + Using real world examples/problems.
  + Students are encouraged to answer problems but will write their answer and steps in paragraph form.
  + Students will work alone.
* Go over final product (20 - remainder of class)
  + Go over product rubrics
  + Show examples of short stories
  + Class will create an example of a short story together.

Task: Start short story

*Day Two (80 Minutes)*:   
*Classroom arrangement: Desks will be in groups of four spread out so that there is space in between each group.*

* Introduction to Triangular Prism (10 minutes)
  + - Students will give their initial level of understanding by either raising a red, yellow, or green post it note.
* Circle the sage (30 - 40 minutes)
  + Students will be in their four groups
  + One person from each group (the sage) will explain how to solve or graph a certain linear equation.
  + Students spend 10 minutes at each group.
  + After 10 minutes the students will go to a different group but the "sage" will stay at the group.
  + Each sage will explain a different aspect of solving, graphing and rearranging linear equations.
* Triangular Prism (10 - 30 minutes)
  + Students give their level of understanding by either raising a red, yellow, or green post it note.
  + Ask students to write on the post it why they feel they have that certain level of understanding.
  + Have the post it notes remain anonymous and read off the comments one at a time
    - According to those comments that suggest the student need further understanding, go over examples and have a small class discussion.
    - Do this until every comment has been read and addressed.
  + Students give their final level of understanding using new post it notes.

Task: Work on Short Story  
  
*Day Three (80 minutes):*   
*Classroom Arrangement: Desks will be in a half oval all facing inwards.*

* Students work on their short story (40 minutes)
  + Students can either work in groups, partners or alone
* Discussion on finding visuals and graphics for short story (15 minutes)
  + Go over how to find graphics and what is appropriate and what is not.
* Go over how to cite credits (15 minutes)
  + Go over how to have a separate page for credits for any graphics or information used that was not their own.

Task: Work on Short Story  
  
*Day Four (40 minutes):*

* Students can work on short story for final touches and fixes (20 - 30 minutes)
* Students fill out the third column of their KWL chart (10 minutes)

Students will understand that graphing two formula functions can allow for finding approximate solutions to the equation. Students will need to understand how to interpret graphs and also if they want to ever be able to go into the stock market; they will need to understand what they are looking at. *Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.*After the students enter the classroom, they will play the hoop shoot equation game as a class. Students will collaborate as a class to find the matching equations.  
**Where, Why, What, Hook Tailors:***Interpersonal, Logical, Visual, Musical.*  
  
Students will know inequalities, equations, slope intercept form. **(See Content Notes)** Students will use the KWL chart to see where they are in their understanding of the concept. I am using this chart as an indicator to how much my students understand the concept. This will let me know where my students are at as well as let the students know how much they are really taking away from the unit. In the next lesson, I am using a KWS chart for the end of the unit and it connects to the KWL chart. Students will each have three colored sticky notes. A red, yellow and a green sticky. Each one corresponds to their level of understanding and the students will raise the colored sticky at the end of the lesson to see their level of understanding. This activity is called Triangular Prism. This will connect with the KWL chart because the students will have to think about their level of understanding in terms of three colors; red, yellow, and green. This will make them think critically about their actual knowledge. Some students may think they understand the concept but when they are asked to think about how much they really know, their thinking might change. Triangular Prism will also let me know where my students are in their understanding. I will already have an idea from previous lessons and products but this will let me know and be able to address it immediately before they complete their product for this lesson.  
**Equip, Explore, Rethink, Tailors:***Visual,* *Logical, Intrapersonal.*  
  
Students will be able to infer that graphing two formula functions can allow for finding approximate solutions to the equation. Students will use the KWL chart which stands for Know, Want, and Learn. They will keep track of their progress throughout the lesson. They will fill out the first two columns at the beginning of the lesson. After the lesson, the students will fill out the third column of the chart. The students will also show their initial understanding using the Triangular prism approach. They will hold up a post it note that corresponds to their level of understanding. They will play Circle the Sage where one person will stand in each corner. These students have a special and more advanced understanding of different parts of the lesson. The rest of the class will visit each student and the sages will explain their understanding. This will allow the students to further their understanding and get help from their fellow peers. Some students will better understand their classmate explaining linear equations than me explaining it to them. The groups will be small so that the students have the undivided attention of the sage and will get more one-on-one help. Each "sage" will explain a different part of solving, graphing and rearranging linear equations. After the activity, each student should have furthered their understanding on all the aspects of linear equations. After the activity students will show their level of understanding again using the Triangular Prism approach. The students should have furthered their understanding and there should be more green post it notes than there are red and yellow. The students will then be asked to write comments on the post it notes saying why they feel they are at that certain level of understanding. I will then collect all the post it notes and read off each comment. The comments will remain anonymous as to avoid singling out students. For each comment, I will both provide more examples and have a class discussion on the comment. At the end of this, I will ask the students to again show their final level of understanding using the same three colors of post it notes.   
**Explore, Experience, Revise, Refine, Tailors:***Interpersonal, Intrapersonal, Kinesthetic, Logical, Visual.*  
  
The students will be working towards student publishing where they will create a book for other students that need to understand the concept being taught. Students will self-assess themselves using a rubric. I will provide feedback on the student publishing. This lesson allows students to think critically about the steps that they take to solve and graph linear equations by having them reiterate it on to paper in the form of a short story.   
**Evaluate, Tailors:**Interpersonal, Logical.  
  
**Content Notes**  
Students will know…..   
*Vocabulary Definitions:*

* Inequalities
* Linear Equation
* Equation
* Slope-intercept Form

Inequality:  
An inequality is a mathematical sentence that compares two quantities that do not equal each other. There are a two main ways to compare quantities:  
> (Greater than)  
< (Less than)  
An example of this is 2 + 3 < 97 – 82 This is saying that 2 + 3 is less than 97 - 82  
To check that this is true, you solve both sides separately which will make this 5 < 15 which saying that 5 is less than 15 which is correct  
Linear Equation:  
A linear equation is an equation whose graph is a straight line in the coordinate plane. The equation can be written like y = 2x -3 This was written using the slope-intercept formula which is defined below.  
Equation:  
An equation is a mathematical sentence that indicates that two number or mathematical expressions are equal. An example of this is 3x - 4 = 19. The equal sign shows that the expression on the left side (3x- - 4) of the equation is equal to the ride side (19) of the equation.  
Slope – Intercept Form:  
The slope - intercept form of a linear equation is given by the following formula: y= mx + b ;(where ‘m’ is the slope and ‘b’ is the y – intercept)  
Slope is a ratio use to measure the steepness of a line. To find slope you must find the change in ‘y’ over the change in ‘x’. This can also be written as: Rise/Run  
The way to find rise/run is to have to points on a line. For example (1,2) and (3,4); to find the ‘rise’ you find the difference between the y coordinates. So; 4 – 2 = 2 then you do the same thing for the x coordinates to find the ‘run’. So; 3 -1 = 2 this will make the final answer be 2/2 which is 1 so the slope is 1.  
  
**Handouts**  
KWL Chart  
Graphing Paper  
  
**Maine Common Core Teaching Standards for Initial Teacher Certification and Rationale**  
*Standard 1 – Learner Development. The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.*  
  
***Learning Styles***  
***Clipboard:*** The expectations for the class are clearly posted inside the classroom and on the class website. It covers everything that is expected and nothing is left to interpretation unless otherwise discussed with me. Students will be given the rubric that has clear expectations as to how to complete the short story.  
***Microscope:***There will be graphic organizers for every part of the unit so students will be able to write down their learning process. There will be checking for understanding throughout the lessons so students will always know if they are retaining the correct information or not. Class collaboration will allow the students to work together and constantly think deeper into the subject.  
***Puppy:***Students will be seated in a half oval so they will also have a fellow classmate on both sides of them to help with any questions. The students will also be split into groups and have group collaboration so that if one student does not understand something, their team members can explain the concept to that student so that every member of the team grasps the specific concept. Classroom expectations will be posted inside the classroom to create a helping and respectful environment for everyone.  
***Beach Ball:*** Students will be creating their own short story in the way that best suits them. They can personalize the story and way they would like. They must explain how to solve and graph linear equations in a creative way that someone else will be able to understand. This gives the students a lot of liberty as to how to write their short story.   
***Rationale:***This lesson meets the standard because I know different strategies to appeal to all kind of learning styles. Students will have multiple opportunities to prove their understanding to further their knowledge in the unit. This lesson requires students to think critically in order to complete their short story. It gives them the freedom to

choose how they create their short story and how to explain how to solve/graph linear equations.  
  
*Standard 6 -* *Assessment. The teacher understands and uses multiple methods of assessment to engage learners in their on growth, to monitor learner progress, and to guide the teacher's and learner's decision making.*  
  
***Formative:***  
**Section I – checking for understanding during instruction**  
Students will each have three colored sticky notes. A red, yellow and a green sticky. Each one corresponds to their level of understanding and the students will raise the colored sticky at the end of the lesson to see their level of understanding.  
**Section II – timely feedback for products (self, peer, teacher)**  
Students will self-assess themselves using a rubric. Teacher will provide feedback on the student publishing.  
  
***Summative:***  
Student Publishing (75 points) Students must write a short story explaining how to solve simple system of linear inequalities. They will be writing this story for other classes to read in future years. Students must be precise and clear on the techniques and will be writing to students that have never learned the concept before. Students must provide many easy to understand examples and visual graphs to make the concept easier to understand. Student will peer edit each other to swap ideas and to make sure there are no mechanical or grammatical errors.  
  
***Rationale:***  
This will let me know where the students are in terms of mastery and understanding of the content being taught. I will use this information in planning future lessons and to strengthen my teaching style and technique so that all students benefit from my lessons. Formative assessments will be used multiple times in my lessons so that I will constantly have an idea of where my students are in their learning.  
  
*Standard 7* - *Planning Instruction. The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.*  
  
***Content Knowledge:***  
Students will know inequalities, equations, slope intercept form.  
  
***MLR or CCSS:***  
**Math Common Core State Standards**  
**Content Area:** Algebra  
**Grade:** High School  
**Domain:** Reasoning with Equations and Inequalities  
**Cluster:** Solve systems of equations  
**Standard:**  
6. Solve systems of linear equations exactly and approximately, focusing on pairs of linear equations in two variables.  
7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically  
***Facet:****Perspective*  
***Rationale:***Students will meet standard seven by creating equations using real-world examples and solving them using graphic organizers to synthesis their data.  
  
*Standard 8 -* *Instructional Strategies. The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.*  
  
***MI Strategies:***  
**Verbal:** While students are playing circle the sage, they will discuss the concept and listen to the sage's explanation.  
**Logic:** Students will use the KWL chart to decipher their thoughts on the chart for better understanding.  
**Visual:** Students must create a student publishing booklet that will include visuals for easier understanding.  
**Kinesthetic:** The students will be moving around the classroom while they visit each sage.  
**Intrapersonal:** Students will work alone as they fill out the KWL chart.  
**Interpersonal:** Students will be interacting with each other as they move around the room to visit the sages.  
  
***Type II Technology:***  
Students will use the student publishing to create their own short story on how to solve linear equations. They will have to write the story to someone that does not have previous knowledge on the concept. They will have to think critically and figure out they solve the equations and put it into a way that someone else will understand if they are learning the concept for the first time.  
***Rationale:***  
This lesson incorporates multiple intelligences to ensure that each student is getting the most out of my unit. This helps so that the students all have an equal opportunity to learn the way they learn best. It ensures that every student is included and engaged in the lesson being taught. I want all students to understand their learning style better so that later on in other classes, they can take this knowledge with them to further their learning.  
  
***NETS STANDARDS FOR TEACHERS***  
**1. Facilitates and Inspire Student Learning and Creativity. Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.**  
a. Promote, support, and model creative and innovative thinking and inventiveness  
  
b. Engage students in exploring real-world issues and solving authentic problems using digital tools and resources  
  
c. Promote student reflection using collaborative tools to reveal and clarify students’ conceptual understanding and thinking, planning, and creative processes  
  
d. Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments  
  
***Rationale:***  
Students will have to think critically in order to create their final product. They will also have to think critically about where they are in terms of their understanding of the concept when filling out the KWL chart. They will get to see their progress when they complete the first two columns of the chart before the lesson and filling out the third column after the lesson.  
  
**2. Design and Develop Digital Age Learning Experiences and Assessments. Teachers design, develop, and evaluate authentic learning experiences and assessment incorporating contemporary tools and resources to maximize content learning in context and to develop knowledge, skills, and attitudes identified in the NETS-S.**  
a. Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity  
  
b. Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress  
  
c. Customize and personalize learning activities to address students’ diverse learning styles, working strategies, and abilities using digital tools and resources  
  
d. Provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching  
  
***Rationale:***  
Students will using student publishing to create a short story about linear equations. They must write assuming that the reader has not had any previous lessons on linear equations. The short story is to help future students learn about linear equations and how to solve/graph them. Through formative and summative assessments, students will have multiple opportunities to prove whether the understand the content, to what extent, and what they need help on understanding. Students will each have the opportunity to learn according to their learning style and their multiple intelligences.